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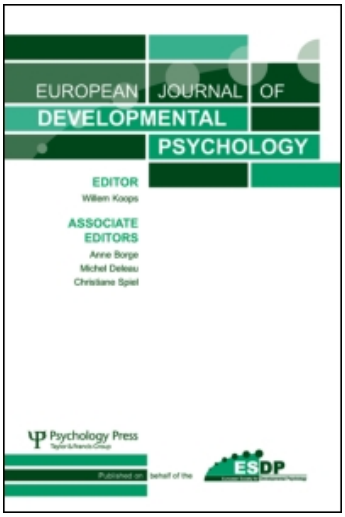

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Age of initiation with different substances and relationships with resources and vulnerabilities: A cross-national study

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Age of initiation with different substances and relationships with resources and vulnerabilities: A cross-national study

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There is still limited knowledge about the interrelations among the age of initiation of different substances and the diverse aspects of adolescent functioning. The present cross-national study aimed at exploring the presence of a time-order pattern of age of initiation of different substances and the relationships with personal and relational resources and vulnerabilities, drawn from the problem behaviour theory by Jessor et al. (1991). The sample consisted of 970 adolescents from Italy and The Netherlands, of whom 198 were fully initiated in alcohol, first tobacco use, regular tobacco smoking and marijuana. In both countries, cumulative scale analyses showed the presence of a pattern of age of initiation in the different types of substances. The earlier the age of onset of one substance, the earlier the age of onset of the other substances. Furthermore, the higher the personal resources and the healthy, conventional parents and friend models, the older the age of initiation of different substances by both Dutch and Italian adolescents. With respect to the use of alcohol, the higher the relational resources, the older the age of initiation. Conversely, the higher the adolescents perceived relational vulnerabilities, the younger their age of initiation in drugs. These findings suggest that preventive interventions might be more successful

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when they are precocious, enhance personal capabilities, and produce changes in the adolescent life context.

Keywords: Age of initiation; Mokken analysis; Multiple substances; Resources; Vulnerabilities.

Many adolescents use psychoactive substances at one time or another. Some start earlier than others and some use more than one substance (Currie et al., 2004; Hibell et al., 2004). For some, substance use brings no serious consequences and is ended before adulthood. For others, this is not the case (Pope & Hammer, 1996; Shedler & Block, 1990). Some authors have underlined that the age of initiation (Tobler, 2000) and the concomitant use of more than one substance (Jessor, Donovan, & Costa, 1991) are crucial points to examine in order to gain a deeper understanding of adolescent substance use.

Though age of initiation has already been indicated as one of the relevant aspects in prefiguring a more or less healthy adult lifestyle (Schulenberg, Maggs, & Hurrelmann, 1997), it has not been investigated in depth. More specifically, there is still no clear answer to the question of whether there are strong links between precocious initiation with different substances and the conditions under which adolescents initiate the use of more than one substance. We know that younger tobacco smokers and marijuana users are more likely to be dependent later on (Julien, 2005; Kandel, 1998). Further, frequent marijuana users start at younger ages and appear to be relatively maladjusted as children (Shedler & Block, 1990). We also know that heavy drinkers are more maladjusted and that they are more likely to maintain a high level of consumption during their transition towards adulthood (Pope & Hammer, 1996). Generally speaking, using drugs at younger ages may negatively affect adolescents' adult development (White, Bates, & Labouvie, 1998). Loeber and colleagues found a similar developmental path among boys who were recruited in mental-health clinics (Loeber, 1990; Loeber, Green, Lahey, Frick, & McBurnett, 2000): some behaviours, such as oppositional behaviour, are developmental precursors of others, e.g., conduct disorders.

Nevertheless, there is still limited knowledge about the interrelationships between age of initiation of different substances and about the aspects of personal and contextual adolescent characteristics that are connected to initiation at different ages, especially in non-clinical samples. Jessor and colleagues (2003) noted that many of the studies on this topic do not take into account the concomitant use of different substances and the psychosocial conditions linked to greater likelihood of early involvement. Magnusson and Stattin (1998) stated that only a few studies use theoretical models that are able to integrate the different domains of adolescent functioning, which, according to a holistic perspective, are very

important: e.g., adolescents' values, self-perception, future perspective, behaviours, and contextual features (Stattin & Kerr, 2002).

In our opinion, one of the few theoretical models that provides a deeper insight into the phenomenon of adolescent substance use is Jessor, Donovan, and Costa's (1991) problem behaviour theory, as it takes into consideration the interactions between behaviour, personality, perceived environment, and social systems. In this theory, the behavioural system considers different aspects (for example, frequency of use and age of initiation) of various risk behaviours and normal daily activities. The personality system considers self-perception, values, and attitudes, such as disapproval of deviance. The perceived environment system includes different aspects, such as friends' models of substance use, parental control, and satisfaction with school. Finally, the social system investigates socio-demographic aspects, such as parents' level of education and occupation. Problem behaviour theory considers both protection and risk. Protective factors decrease risk by providing models for positive behaviour, values, and controls against risk behaviour and a supportive environment. On the contrary, risk factors increase risk by providing models for risky behaviour and increased opportunity to engage in these behaviours. These protection and risk factors have been shown to be strongly related to multiple outcome criteria (e.g., antisocial behaviour, problem drinking, precocious or unprotected sex), and to vary across groups based on gender, age, socioeconomic status, and ethnicity (Costa et al., 2005; Jessor, Turbin, & Costa, 1998). Furthermore, the problem behaviour theory postulates the presence of a developmental pattern of different risk behaviours and the ages at which these are initiated (Donovan, Jessor, & Costa, 1998): The adolescent who precociously initiates a certain risk behaviour is more likely to initiate other risk behaviours precociously and to be more highly involved in risk situations. The underlying assumption is that risk behaviour becomes more likely under particular conditions of vulnerability, which expose the individual to multiple risks.

However, very few European studies have referred to problem behaviour theory to analyse adolescent drug use, despite its potential utility (Bonino, Cattelino, & Ciairano, 2005; Ciairano, 2004). Furthermore, no studies have employed it to explore the connections between precocious initiation of substances and vulnerabilities and resources. Recently, we investigated levels of involvement in various substances (alcohol, tobacco, marijuana, stimulants, and hallucinatory drugs) and the relationships with personal and relational resources and vulnerabilities, as defined in problem behaviour theory (Ciairano, van Schuur, Bonino, Molinengo, & Miceli, 2006b). We found that the more personal resources and positive models the adolescents had, the lower their use of different substances. Conversely, the more they perceived relational vulnerabilities, the higher their involvement in drugs.

However, this study did not focus specifically on adolescents who use multiple substances.

The present study was an attempt to overcome these limitations by examining the presence of a pattern in the initiation of different substances and the relationships with resources and vulnerabilities in a sample of Italian and Dutch adolescents who had all four of the aspects of initiation under study: alcohol, first tobacco use, regular tobacco smoking, and marijuana use. That is to say, they were fully initiated to these substances.

We selected Italy and The Netherlands because they differ with respect to prevalence, social policies, and cultural scripts with regard to substance use and patterns of transition towards adulthood. These social and cultural aspects may influence the onset of use, prevalence of substances, and protection and risk, as they contribute to determining which tasks are most urgent for youth and how to respond to them. According to ESPAD (The European School Survey Project on Alcohol and Other Drugs; Hibell et al., 2004), a smaller percentage of Italian adolescents compared to Dutch adolescents had been drunk, while a larger percentage had smoked. No differences were found in the two groups in terms of marijuana and other illegal drug use. The Italians' more temperate alcohol drinking may be related to cultural tradition, such as consuming wine moderately and regularly, e.g., at lunch on a daily basis, instead of using alcohol heavily and occasionally, e.g., on Saturday night or during parties as in Northern-European countries (Gual & Colon, 1997; Lintonen & Konu, 2003). Higher tobacco smoking among Italians may be related to the fact that, compared to Northern European countries, prevention programs against tobacco smoking were introduced much more recently in Italy. Marijuana, though easily available, is illegal in Italy, while in The Netherlands its use is condoned in specific settings and after having reached the legal age (Brouwer, 2000). Furthermore, the Italian transition towards adulthood is generally postponed compared to Northern European countries (Bonino, Cattelino, & Ciairano, 2006; Buzzi, Cavalli, & de Lillo, 2002; Du Bois-Reymond, Diekstra, Hurrelmann, & Peters, 1995). Considering these differences, discovering similar underlying processes of adolescent substance use would further support the problem behaviour theory, which has mainly been used in non-European contexts.

In summary, this study addresses the following three research questions:

1. Are there differences between the adolescents who had passed all the four stages of initiation (alcohol, first tobacco use, regular tobacco smoking and marijuana) and those who had not with respect to the age of initiation in each of these substances and with respect to personal and relational resources and vulnerabilities? Besides, if there are some differences, are they the same or different in Italy and The Netherlands? We expected that the adolescents who had passed the four stages of initiation were also

initiated with each of these substances at younger ages. Furthermore, we expected that these adolescents would have lower levels of resources and higher levels of vulnerabilities than the others. Finally, we expected that these differences would be the same in both countries.

2. Is there a specific time-order pattern in the age of initiation with different substances (alcohol, tobacco, regular smoking, and marijuana), and is this pattern the same or different in Italy and The Netherlands? We expected that the age of initiation with different substances would follow the same time-order pattern in both countries because the underlying process of initiation is similar, despite the social and cultural differences between these two countries.
3. What are the relationships between the pattern of age of initiation and resources and vulnerabilities, and are these relationships the same or different in Italy and The Netherlands? On the basis of the previous study (Ciairano et al., 2006b), we also expected to find that in both countries more resources would be related to an older age of initiation, while more vulnerabilities would be related to a younger age of initiation. This means that we expected that, despite the peculiarity of having been initiated with the four different substances—which poses greater physical and psychosocial risks—the underlying processes would be similar to those we found when we considered the relationships between involvement, resources, and vulnerabilities.

METHOD

Participants

This study used the same original sample of the previous paper (Ciairano et al., 2006b) for the first part of the analyses, which addressed the differences between the adolescents who had passed all the four stages of initiation and those who had not. The original sample consisted of 970 Italian and Dutch adolescents, living in the northwest of Italy and in the northeast of The Netherlands. This sample was reasonably balanced for country (52% Italian and 48% Dutch), gender (52% boys and 48% girls), age (15–17 years: 56%; 18–19 years: 44%; mean age = 17.4), and type of school (31% lyceum or VWO, 69% technical and vocational school and HAVO[1]).

However, as criteria for inclusion in the following analyses was having passed the four stages of initiation with alcohol, first tobacco use, regular tobacco smoking, and marijuana, (second and third research questions) the

[1]The Dutch VWO (preparatory to a university education) is comparable to the Italian Lyceum. However, entrance to university in Italy is open to graduates of all different types of high schools. The Dutch HAVO (higher general advanced education) is a lower level than VWO.

sample was subsequently reduced to 198 Italian (73%) and Dutch (27%) adolescents. This sample represented 20% of the original sample. The reduction of the sample was greater among the Dutch than the Italian respondents, because the proportion of Dutch and Italian adolescents who smoke tobacco is quite different: Non-Smokers: 78% in the Netherlands and 56% in Italy; Light Smokers: 19% in the Netherlands and 33% in Italy; Heavy Smokers: 3% in the Netherlands and 11% in Italy; $\chi^2(2, N = 923) = 55.29$, $p < .0001$.

The mean age of the adolescents who had passed the four stages of initiation (i.e., who were full initiated) was higher than that of those who had not: $M = 17.89$, $SD = 1.42$ vs. $M = 17.21$, $SD = 1.29$; $t(962) = -6.351$, $p < .0001$. The proportion between different types of schools also differed: the percentage of students in the lower school track (technical and vocational school or HAVO) was higher among the adolescents who were included in the second and third parts of the analyses (78% vs. 69%) and, conversely, the percentage of students in the higher school track (lyceum or VWO) was lower (22% vs. 31%); $\chi^2(1, N = 968) = 10.42$, $p < .0001$. The percentage of intact families was slightly lower among the fully initiated adolescents (85% vs. 90%), but the difference was not significant $\chi^2(1, N = 968) = 2.11$, $p = .156$. Finally, the proportion of boys and girls who were or were not included in the second and third parts did not differ; 54% vs. 52% boys; 46% vs. 48% girls; $\chi^2(1, N = 968) = 0.89$, $p = .344$.

Questionnaires

The Italian (Bonino et al., 2005) and Dutch versions (Ciairano, 2004) of the questionnaire "Me and My Health" were used to collect the data. These questionnaires are adaptations of the *Health Behaviour Questionnaire* (Jessor, Donovan, & Costa, 1992) for the Italian and Dutch contexts. They contain around 600 questions that investigate health and psychosocial risk behaviours and other dimensions of adolescent psychological functioning, such as well-being and normal daily activities. In both countries, data were collected at school, in the absence of teachers, by well-trained researchers. Subjects were guaranteed anonymity, and parental and adolescent consent was required in accordance with Italian and Dutch law.

Measures

With respect to the time-order pattern of substance use, we investigated the ages of initiation[2] for alcohol, first tobacco use, regular tobacco smoking,

[2]"How old were you the first time you had an alcoholic drink?" "How old were you when you first smoked a cigarette?" "How old were you when you started smoking cigarettes on a regular basis?" "How old were you when you first tried marijuana?"

and marijuana. No information was obtained about the age of initiation for other drugs. For the first research question, we dichotomously distinguished adolescents who had been fully initiated in all four substances versus all others. For the second and third research questions, we established the time-order pattern of the ages at which the adolescents were initiated in each of the four substances, using Mokken's non-parametric cumulative scaling procedure (Mokken, 1971; Sijtsma & Molenaar, 2002; van Schuur, 2003). The results of these analyses are reported in the second part of the results section.

Resources and vulnerabilities were assessed through the same four composite measures (each one consisting of a number of subscales as listed below) that we have already used in a previous study about the relationships among involvement in different substances, resources, and vulnerabilities (Ciairano et al., 2006b). We refer to this study for the rationale of the selection of the subscales and their content. We also refer to the previous study to show that all the expected component subscales load on the correct factor with an explained variance of 61% using explorative principal component analysis, that the majority of the reliabilities of the factors and of their component subscales are satisfactory, and, finally, that the factorial structure is very similar in the two country samples. In the present study, we only report a brief summary of the psychometric characteristics of the factors, which we will use as (varimax rotated) factor scores in the subsequent regression models.

The first factor "personal resources and positive models" consisted of five subscales (eigenvalue 2.36, expl. var. 24%; Cronbach's α .66 among the Italians and .61 among the Dutch): school success and beliefs; value of school; conventional attitudes; productive activities; healthy, conventional parents and friend models.

The second factor "relational vulnerabilities" consisted of two subscales (eigenvalue 1.34, expl. var. 13%; Cronbach's α .50 among the Italians and .59 among the Dutch): fun-oriented leisure activities, risk availability. We considered fun-oriented leisure activities as vulnerabilities because previous studies have shown that, unlike the productive activities aimed at the development of long-term plans for self-fulfilment (Mahoney & Stattin, 2000), they may act as risk factors.

The third factor "personal vulnerabilities" consisted of one scale (eigenvalue 1.29, expl. var. 13%; Cronbach's α .82 among the Italians and .83 among the Dutch): negative feelings.

The fourth factor "relational resources" consisted of two subscales (eigenvalue 1.11, expl. var. 11%; Cronbach's α .38 among the Italians and .48 among the Dutch): degree of parent–peer agreement, family support.

RESULTS

Differences between adolescents who have passed the four stages of initiation and the others

The first research question refers to whether there are differences between the adolescents who have the passed four stages of initiation (alcohol, first tobacco use, regular tobacco smoking, marijuana) and those who have not in terms of age of initiation in each singular substance, resources and vulnerabilities. We wondered whether these differences were the same or different in Italy and The Netherlands. Therefore, we applied a series of 2×2 ANOVAs, considering two between-subject factors (Country: Netherlands and Italy; Being fully initiated or not), and the interaction term (Country $\times$ Being fully initiated or not).

We repeated the same analysis for each of the stages of initiation (alcohol, first tobacco use, regular tobacco smoking, and marijuana; Table 1) and for the four variables of resources and vulnerabilities (personal and relational resources, personal and relational vulnerabilities; Table 2).

With respect to being initiated in the individual substances or not (Table 1), we first found some significant differences between Italian and Dutch adolescents in relation to the age of initiation in three of the four substances: first tobacco use, regular tobacco smoking, and marijuana. In all these cases, Dutch adolescents initiate use about one year earlier than the Italians. The Italians start as early as the Dutch with drinking alcohol.

Second, we found that only the age of initiation with regular tobacco smoking differed between the adolescents who were fully initiated and those who were not: the former had initiated regular tobacco smoking about half a year earlier than the latter, at around 13 years.

Finally, we also found two significant interactions between Country and Being fully initiated or not. More specifically, Dutch youth who have been fully initiated in all the substances considered in the present study had started to drink alcohol and smoke regularly at a significantly younger age than fully initiated Italian youth.

With respect to the personal and relational resources and vulnerabilities (Table 2), we first found some significant differences between Italian and Dutch adolescents in relation to the four aspects of resources and vulnerabilities. Italian adolescents had more resources than Dutch adolescents. In addition, the Italians also perceived higher personal vulnerability and lower relational vulnerability. We already had this information from our study mentioned previously (Ciairano et al., 2006b).

Second, we found that the adolescents who were fully initiated differed from the others in terms of their personal resources and personal and relational vulnerabilities. The former also had lower personal resources and higher personal and relational vulnerabilities than the latter.

TABLE 1
Age of initiation of each singular substance—ANOVA 2 (Country) × 2 (Being fully initiated or not)—Mean (Standard Error)

	Country		*Being fully initiated or not*			*Country × Being fully initiated or not*				
	Netherlands	*Italy*	*F (df) p*	*No*	*Yes*	*F (df) p*	*Age init.*	*Netherlands*	*Italy*	*F (df) p*
Alcohol: age of initiation	12.67 (0.19)	12.63 (0.13)	0.03 (1, 806) .864	12.74 (0.11)	12.56 (0.20)	0.64 (1, 806) .425	No	**13.08 (0.14)**	**12.40 (0.16)**	**7.60 (1, 806) .006**
							Yes	**12.26 (0.35)**	**12.85 (0.21)**	
First tobacco use: age of initiation	**12.85 (0.19)**	**13.79 (0.11)**	**17.34 (1, 406) .0001**	**13.64 (0.16)**	**13.00 (0.16)**	**8.22 (1, 406) .004**	No	13.33 (0.28)	13.95 (0.16)	2.02 (1, 406) .156
							Yes	12.37 (0.27)	13.63 (0.17)	
Regular tobacco smoking: age of initiation	**14.54 (0.16)**	**15.18 (0.12)**	**10.43 (1, 291) .001**	14.87 (0.16)	14.85 (0.12)	0.007 (1, 291) .934	No	**14.83 (0.24)**	**14.91 (0.20)**	**7.92 (1, 291) .005**
							Yes	**14.26 (0.21)**	**15.45 (0.13)**	
Marijuana: age of initiation	**14.72 (0.12)**	**15.58 (0.10)**	**32.01 (1, 340) .0001**	15.29 (0.11)	15.01 (0.11)	3.43 (1, 340) .065	No	14.86 (0.15)	15.73 (0.17)	0.00 (1,340) .99
							Yes	14.57 (0.18)	15.44 (0.11)	

TABLE 2
Vulnerabilities and Resources—ANOVA 2 (Country) × 2 (Being fully initiated or not)—Mean (Standard Error)

	Country		*Being fully initiated or not*			*Country × Being fully initiated or not*				
	Netherlands	*Italy*	*F (df) p*	*No*	*Yes*	*F (df) p*	*Age init.*	*Netherlands*	*Italy*	*F (df) p*
Personal resources and positive models	**−0.34 (0.09)**	**0.04 (0.06)**	**11.92 (1, 497) .001**	**0.15 (0.05)**	**−0.45 (0.10)**	**29.92 (1, 497) .0001**	No	−0.09 (0.07)	0.38 (0.07)	0.84 (1, 497) .361
							Yes	−0.58 (0.16)	−0.31 (0.11)	
Relational resources	**−0.18 (0.09)**	**0.14 (0.07)**	**8.10 (1, 497) .005**	0.02 (0.05)	−0.06 (0.10)	0.44 (1, 497) .508	No	−0.13 (0.07)	0.16 (0.08)	0.04 (1, 497) .834
							Yes	−0.23 (0.17)	0.11 (0.11)	
Personal vulnerabilities	**−0.25 (0.09)**	**0.38 (0.06)**	**35.11 (1, 497) .0001**	**−0.06 (0.05)**	**0.19 (0.09)**	**5.24 (1, 497) .022**	No	−0.38 (0.06)	0.26 (0.07)	0.01 (1, 497) .941
							Yes	−0.12 (0.16)	0.50 (0.10)	
Relational vulnerabilities	**0.60 (0.08)**	**−0.13 (0.06)**	**50.31 (1, 497) .0001**	**−0.18 (0.05)**	**0.65 (0.09)**	**64.14 (1, 497) .0001**	No	0.12 (0.06)	−0.49 (0.07)	1.42 (1, 497) .234
							Yes	1.07 (0.15)	0.22 (0.10)	

Finally, as expected, we did not find any significant interaction between Country and Being fully initiated or not.

The pattern of age of initiation for different substances

With respect to the second research question, which refers to whether there is a specific pattern in the age initiation for different substances (alcohol, tobacco and marijuana) and whether this pattern is the same or different in Italy and The Netherlands, we applied the Mokken scale analysis for each country. The Mokken scale analysis is a non-parametric version of Guttman's cumulative scaling model (Mokken, 1971; Sijtsma & Molenaar, 2002; van Schuur, 2003).

The hypothesis of a specific time-order in the age of initiation is set against a null-hypothesis that no such specific order exists, i.e., that this order can differ randomly among subjects. For a specific order (i.e., a non-parametric Guttman scale, or a Mokken scale) to exist, each pair of variables (in our case, age of initiation in a particular substance) can be ordered such that the initiation in one substance empirically implies the initiation in the other substance. The amount of deviation in the implicational order of a pair of variables (i.e., the amount of model violation) is compared to the amount of deviation under the assumption that the variables are unrelated. The amount of deviation is given as Loevinger's coefficient of homogeneity, which is identical to the Pearson correlation coefficient, divided by its maximum value, given the marginal distributions of the variables. This emphasis on implicational model violations makes the Mokken scaling procedure particularly useful for developmental studies. As is true for any analyses of temporal orders, a temporal order is a necessary but not sufficient condition for the establishment of causality. In this study, the temporal orders we find are strong enough to be taken seriously.

The results showed that in both countries, there is a specific pattern for ages of initiation: All four ages of initiation examined (initiation of alcohol use, initiation of and regular use of tobacco, and initiation of marijuana) belong to the same scale (Table 3). We found cumulativity: all coefficients of homogeneity were relatively high[3] and there was a unidimensional cumulative relationship in substance use that was quite similar in Italy and The Netherlands. Other model tests, such as monotone homogeneity and double monotonicity, showed no significant violations of the probabilistic cumulative model. In general, the adolescent who started with one substance at a younger age is more likely to start the others at a younger age as well. In both countries, adolescents initiated alcohol use earliest,

[3]Coefficients over .30 are sufficient, higher than .50 suggest a strong cumulative scale.

quickly followed by tobacco and then, more than a year and a half later, marijuana.

There are some differences between Italian and Dutch adolescents (Tables 3 and 4). First, Dutch adolescents ($N = 54$) initiated use of each substance about one year earlier than the Italians ($N = 144$). Second, Italian adolescents initiated marijuana use a bit earlier than they initiated regular smoking, while this order was reversed for the Dutch. Nevertheless, the results of Mokken analyses showed that in both countries, despite differences in mean values and ordering, all the substances belong to the same scale (Table 3). Besides, the reliabilities (Cronbach's α) of the four items of age of initiation were satisfactory and similar in the two country samples (Table 4).

Therefore, we calculated the scale for age of initiation with alcohol, tobacco, regular tobacco smoking, and marijuana. Subjects involved with all the substances were assigned a scale score (called age of average initiation), which consisted of the average of the four ages of initiation.

We used the score for age of average initiation as the dependent variable in the subsequent regression analyses to find out which aspects, among resources and vulnerabilities, led to a lower (younger ages) or higher (older ages) value on this scale. However, we also used the age of initiation in each substance considered separately.

TABLE 3
Mokken analysis for age of initiation

	Italy		*The Netherlands*	
Age of initiation with substances	*N = 144 Mean Age*	*Scale coefficient H = 0.49 ItemH*	*N = 54 Mean Age*	*Scale coefficient H = 0.41 ItemH*
Alcohol	13.4	0.35	12.6	0.30
First tobacco use	13.8	0.53	12.7	0.47
Marijuana	15.4	0.57	14.6	0.32
Regular tobacco smoking	15.5	0.53	14.3	0.54

TABLE 4
Mokken's score of/average age of initiation: Reliability and descriptive measures

Measure (number of items)	α		*M (SD)*		*t (df)*	*Sig. (2-tailed)*
	Italian	*Dutch*	*Italian*	*Dutch*		
Average age of initiation (4)	.68	.72	14.34 (1.42)	13.37 (1.25)	−4.45 (196)	.0001

Relationships between resources, vulnerabilities, and age of initiation with substance use

With respect to the third research question about the relationships between age of initiation with different substances and resources and vulnerabilities, controlling for the country and the interactions between predictors and country, we used hierarchical regression analysis.

In the regression models (one for each dependent variable: age of average initiation and the four ages of initiation in the separate substances), we entered the country in Step 1 (we coded Italy with 1, and The Netherlands with 0), resources and vulnerabilities (four variables) in Step 2, and finally in Step 3 we entered the four interactions between predictors and country.

As we expected, the personal resources were positively related to older ages of initiation, while the relational vulnerabilities were related to younger ages for average initiation and also for first tobacco use and marijuana (Table 5). The higher the adolescents perceived personal resources, the older the age of initiation they reported for first tobacco and marijuana use. Conversely, the higher the adolescents perceived relational vulnerabilities, the younger their age of initiation for alcohol, first tobacco use, and marijuana. However, we also found that relational resources were positively related to older age of initiation of alcohol drinking. The higher the adolescents perceived the degree of agreement of parent and friends and parental support and closeness to the family, the older the age of initiation they reported for alcohol.

Furthermore, we found great similarities between the two countries. Only one interaction between country and personal vulnerabilities was significant: the higher the Italian adolescents (coded as 1) perceived personal vulnerabilities, the younger they initiated the use alcohol. This was not the case for Dutch adolescents.

The age of average initiation was better explained (20%) than the age of initiation in marijuana (14%), first tobacco use (12%), or alcohol (5%).

DISCUSSION

In this study, we first expected that the adolescents who were fully initiated would have initiated each substance at a younger age and that they would have higher levels of vulnerabilities and lower levels of resources than adolescents who were not fully initiated.

Second, we expected that the age of initiation of different substances would constitute a pattern, similar in both the countries investigated.

Furthermore, we expected that higher levels of vulnerabilities would be related to younger ages of initiation and, conversely, that higher levels of

TABLE 5
Hierarchical regression results of country, resources, and vulnerabilities predicting age of initiation (global score and initiation with different substances)

	Age of initiation									
	Mokken's score/ average age of initiation		*Alcohol*		*First tobacco use*		*Regular tobacco smoking*		*Marijuana*	
Predictors	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2
Step 1		.08**		.01*		.06***		.04*		.07***
Country	.28**		−.12*		.25***		.20*		.26***	
Step 2		.10*		.02*		.05*		.02		.06*
Personal resources and positive models		.25**		.05		.18**		.10		.20**
Relational resources	−.06		.10*		.01		−.04		.01	
Personal vulnerabilities	−.00		.06		−.06		.01		.07	
Relational vulnerabilities	−.28**		−.10*		−.16*		−.08		−.19*	
Step 3—Interaction Country ×		.02		.02*		.01		.02		.01
Personal resources and positive models		−.07		−.10		−.08		−.17		.07
Relational resources	−.09		.03		−.04		−.11		−.06	
Personal vulnerabilities	.07		.17*		.12		.06		−.01	
Relational vulnerabilities	−.16		.04		.11		.19		−.11	

Note: *$p < .05$; **$p < .01$; ***$p < .001$.

resources would be related to older ages. Finally, we expected that the relationships among resources, vulnerabilities, and age of initiation with different substances would be substantially similar in two European countries, which are characterized by different social and cultural scripts about substance use and also different timing of transition towards adulthood, despite some differences in the rates of both age of initiation and resources and vulnerabilities.

We found that the adolescents who were fully initiated differed from the others because they had initiated regular tobacco smoking at younger ages and they also had lower personal resources and higher personal and relational vulnerabilities. There were some differences between the countries, but they were limited to ages of initiation of alcohol and regular tobacco smoking. In both cases, the Dutch initiated at younger ages whether or not they were fully initiated. Conversely, the Italians initiated at older ages whether they were initiated or not. The finding with respect to the age of initiation of alcohol may be related to the differences between Northern-European and Mediterranean countries concerning alcohol use. More precisely, this finding seems to confirm what we have already shown in some previous studies (Bonino et al., 2005; Ciairano, 2004): in Italy, a younger age of initiation with alcohol might be more related to cultural tradition (which allows children to taste a few sips of wine at lunch) than to a precocious—and therefore more at-risk—pattern of involvement in substances. The finding with respect to the age of initiation of regular tobacco smoking might be explained in relation to the fact that tobacco smoking in general seems much more common among Italian than Dutch adolescents (Ciairano et al., 2006b), and thus it might also be more "normative". That is to say that Italian adolescents are more likely to become regular smokers although they are not fully initiated in all the other substances. However, these findings certainly need further confirmation by other studies.

In both countries, we found a time-order pattern among the ages of initiation for alcohol drinking, first tobacco use, regular tobacco smoking, and marijuana use. The earlier the age of onset of one substance, the earlier the age of onset of the other substances. Despite some differences in the mean values and ordering, this finding underlines that prevention addressed at delaying the onset of one substance might affect the onset of the other substances. Thus, early preventive interventions are recommended before a vicious cycle of initiating different substances can begin (Weichold, Giannotta, Silbereisen, Ciairano, & Wenzel, 2006).

Our findings also confirmed Jessor's hypotheses about both the co-occurrence of different kinds of risk behaviour during adolescence and the assumption that risk behaviour becomes more likely under particular conditions of lack of resources and abundance of vulnerability (Jessor et al., 1998), which expose the individual to multiple risks: some adolescents are

more at risk than others. Besides, as other studies have underlined for clinical populations, some behaviours are probably developmental precursors of others (Loeber, 1990; Loeber et al., 2000). In this study, we showed this phenomenon recurring to the developmental implication of cumulative Mokken scaling; although we would need longitudinal data set to investigate it further.

We also found that the underlying processes related to initiation of substance use are similar with respect to different substances and also in different social and cultural contexts. Our findings show that, as we expected, the differences registered in mean rates between two countries are not very informative about which are the possible protective and risk factors on which we can intervene. These findings have some implication for the possibility of implementing similar prevention programmes against different risk behaviours and in different contexts. Our findings seem to support, although indirectly, the most recent trends in primary prevention interventions. We found that in both countries it would be relevant to intervene especially on personal resources and positive models and relational vulnerabilities. The most complete and up-to-date meta-analyses (e.g., Tobler, 2000; Tobler & Stratton, 1997) showed that the effective interventions programmes are generally interactive and comprehensive, that is to say that they require interactions among peers, and also concomitant changes in the family as well as in the community. Different approaches are much less effective because they do not provide opportunities for the exchange of ideas between peers and they are not able to face the several pro-drug influences experienced by today's youth in the larger community. Our findings suggest similar indications.

Nevertheless, we also found some exceptions to the general phenomenon of substance use, especially in the case of initiation with alcohol. Our results underlined that sometimes the problems are not related to the age of onset per se but to the particular personal and relational condition in which initiation occurs. This is the case for instance for alcohol use: our findings showed that the initiation of early alcohol use is more related to the use of other substances in The Netherlands compared to Italy, probably because of the deep cultural differences in use between these two countries. However, our findings also underlined that initiation of alcohol is more related to personal vulnerabilities among Italian adolescents. Furthermore, initiation of alcohol seems quite different from initiation in the other substances: it appears more strongly related, at least in this life phase, to relational aspects than to personal characteristics. This reflection seem to be also corroborated by some previous studies, which underlined the relational value of, especially moderate, alcohol use during adolescence, also in order to enter friendship and dating markets, which are quite relevant to the adolescence life phase (Engels, 1998; Engels & Knibbe, 2000; Engels, Knibbe, & Drop, 1999).

We also found that there are very similar relationships among resources, vulnerabilities, and substance in the subgroups of adolescents who are involved in all the substances that we considered in the present study and the other above-mentioned study (Ciairano et al., 2006b). This seems to suggest that some intervention programmes can be used at two levels: before the initiation or at very preliminary stage of involvement and later on. This reflection, which certainly also needs further confirmation from other studies, is particularly interesting because applying different kinds of intervention in relation to the stage of involvement can cost too much for the community. Besides, applying different interventions to adolescents who share the same life context (e.g., at the school) can be extremely detrimental in terms of the possible iatrogenic effects of intervention, such as negative labelling (Ferrer-Wreder, Stattin, Lorente, Tubman, & Adamson, 2004). Our findings suggest that reducing contextual vulnerabilities and enhancing personal resources might be relevant, even when the adolescent is already involved in multiple substances. These findings also gave us other strategies for introducing efficient interventions: to enhance personal capabilities and to reduce the amount of contextual risk seem to be more important than to decrease the level of personal discomfort.

Finally, we found no significant relations of personal and relational resources and vulnerabilities to regular tobacco smoking. This interesting result could perhaps mean that prevention, at least by the way of enhancing personal resources and diminishing relational vulnerabilities, does make sense especially or only with respect to first tobacco use. On the bases of a parallel longitudinal study, we have already stated that early intervention to delay the age of onset is more likely to be successful than later intervention (Ciairano, Settanni, van Schuur, & Miceli, 2006a).

This study has several limitations. First, the operationalization of the age of initiation is intrinsically weak because it does not allow us to distinguish between moderate and heavy use. Second, some of the measures have weak reliabilities. Third, we did not consider the possible interactions between biological, psychological and sociological factors. Finally, the cross-sectional design does not allow us to draw any kind of causal conclusion, or track these adolescents' future development.

However, our findings suggest that beyond the social and cultural context, younger age of initiation in one substance prefigures younger age of initiation in others. Thus, preventing precocious onset should be a universally effective prevention strategy. Furthermore, later interventions, working at both the contextual and the individual levels, may still be effective.

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REFERENCES

Bonino, S., Cattelino, E., & Ciairano, S. (2005). *Adolescents and risk. Behaviors, functions and protective factors*. New York: Springer Verlag.

Bonino, S., Cattelino, E., & Ciairano, S. (2006). Italy. In J. J. Arnett (Ed.), *International encyclopedia of adolescence* (pp. 510–523). London & New York: Routledge.

Brouwer, J. G. (2000). *Drugsbeleid: een derde weg*. Groningen, The Netherlands: Faculty of Law, University of Groningen.

Buzzi, C., Cavalli, A., & de Lillo, A. (2002). *Giovani nel nuovo secolo*. Bologna, Italy: Il Mulino.

Ciairano, S. (2004). *Risk behaviour in adolescence: Drug-use and sexual activity in Italy and the Netherlands*. Groningen, The Netherlands: Stichting Kinderstudies Publisher.

Ciairano, S., Settanni, M., van Schuur, W., & Miceli, R. (2006a). Adolescent substance use, resources and vulnerabilities: A cross-national and longitudinal study. *SUCHT, German Journal of Addiction Research and Practice, 52*(4), 253–260.

Ciairano, S., van Schuur, W. H., Bonino, S., Molinengo, G., & Miceli, R. (2006b). The use of psychoactive substances among Dutch and Italian adolescents: The contribution of personal and relational resources and vulnerabilities. *European Journal of Developmental Psychology*, *3*, 321–337.

Costa, M. F., Jessor, R., Turbin, M. S., Dong, Q., Zhang, H., & Wang, C. (2005). The role of social contexts in adolescence: Context protection and context risk in the US and China. *Applied Developmental Science*, *9*(2), 67–85.

Currie, C., Roberts, C., Morgan, A., Smith, R., Settertobulte, W., Samdal, O., et al. (Eds.). (2004). *Young people's health in context. Health Behaviour in School-aged Children (HBSC) study: International report from the 2001/2002 survey*. Retrieved 3 June 2004, from http://www.hbsc.org/

Donovan, J. E., Jessor, R., & Costa, F. (1998). The syndrome of problem behavior in adolescence: A replication. *Journal of Consulting and Clinical Psychology*, *56*, 762–765.

Du Bois-Reymond, M., Diekstra, R., Hurrelmann, K., & Peters, E. (Eds.). (1995). *Childhood and youth in Germany and The Netherlands*. Berlin, Germany: Walter de Gruyter.

Engels, R. C. M. E. (1998). Functions of pub-going for late adolescents. In R. Engels, (Ed.), *Forbidden fruits. Social dynamics in smoking and drinking behavior of adolescents* (pp. 97–110). Maastricht: Universitaire Pers Maastricht.

Engels, R. C. M. E., & Knibbe, R. A. (2000). Alcohol use and intimate relationships in adolescence: When loves comes to town. *Addictive Behaviour*, *25*, 435–439.

Engels, R. C. M. E., Knibbe, R. A., & Drop, M. J. (1999). Visiting public drinking places: An exploratory study into the functions of pub-going for late adolescents. *Substance Use and Misuse*, *34*, 1061–1080.

Ferrer-Wreder, L., Stattin, H., Lorente, C. C., Tubman, J. G., & Adamson, L. (2004). *Successful prevention and youth development programs*. New York: Kluwer Academic/Plenum Publishers.

Gual, D., & Colon, J. (1997). Why has alcohol consumption declined in countries of southern Europe? *Addiction*, *92*(Suppl. 1), S21–S31.

Hibell, B., Andersson, B., Bjarnasson, T., Ahlström, S., Balakireva, O., Kokkevi, A., et al. (2004). *The ESPAD report 2003. Alcohol and other drug use among students in 35 European countries*. The Swedish Council for Information on Alcohol and Other Drugs (CAN) and The Council of Europe, Cooperation Group to Combat Drug Abuse and Illicit Trafficking in Drugs (Pompidou Group). Retrieved 12 October 2005, from http://www.espad.org/findings.html

Jessor, R., Donovan, J. E., & Costa, F. M. (1991). *Beyond adolescence—Problem behavior and young adult development*. New York: Cambridge University Press.

Jessor, R., Donovan, J. E., & Costa, F. M. (1992). *Health Behavior Questionnaire. High school form*. Boulder, CO: Institute of Behavioral Science, University of Colorado.

Jessor, R., Turbin, M. S., & Costa, F. M. (1998). Protective factors in adolescent health behavior. *Journal of Personality and Social Psychology*, *75*, 788–800.

Jessor, R., Turbin, M. S., Costa, F. M., Dong, Q., Zhang, H., & Wang, C. (2003). Adolescent problem behavior in China and the United States: A cross-national study of psychosocial protective factors. *Journal of Research on Adolescence*, *13*(1), 329–360.

Julien, R. M. (2005). *A primer of drug action*. New York: W. H. Freeman.

Kandel, D. B. (1998). Persistent themes and new perspectives on adolescent substance use. In R. Jessor (Ed.), *New perspectives on adolescent risk behavior* (pp. 43–89). Cambridge, UK: Cambridge University Press.

Lintonen, T. P., & Konu, A. I. (2003). Adolescent alcohol beverage type choices reflect their substance use patterns and attitudes. *Journal of Youth and Adolescence*, *32*(4), 279–289.

Loeber, R. (1990). Development and risk factors of juvenile antisocial behavior and delinquency. *Clinical Psychology Review*, *10*, 1–41.

Loeber, R., Green, S. M., Lahey, B. B., Frick, P. J., & McBurnett, K. (2000). Findings on disruptive behavior disorders from the first decade of the developmental trends study. *Clinical Child and Family Psychology Review*, *3*(1), 37–60.

Magnusson, D., & Stattin, H. (1998). Person–context interaction theories. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology. Vol. 1: Theoretical models of human development* (pp. 685–759). New York: Wiley.

Mahoney, J., & Stattin, H. (2000). Leisure activities and adolescent antisocial behavior: The role of structure and social context. *Journal of Adolescence*, *23*, 113–127.

Mokken, R. J. (1971). *A theory and procedure of scale analysis with applications in political research*. New York & Berlin, Germany: De Gruyter.

Pope, H., & Hammer, T. (1996). How does young people's alcohol consumption change during the transition to early adulthood? A longitudinal study of changes at aggregate and individual level. *Addiction*, *91*(9), 1345–1357.

Schulenberg, J., Maggs, J. L., & Hurrelmann, K. (1997). Negotiating developmental transitions during adolescence and young adulthood: health risks and opportunities. In J. Schulenberg, J. L. Maggs, & K. Hurrelmann (Eds.), *Health risks and developmental transitions during adolescence* (pp. 1–19). Cambridge, UK: Cambridge University Press.

Shedler, J., & Block, J. (1990). Adolescent drug use and psychological health: A longitudinal inquiry. *American Psychologist*, *45*(5), 612–630.

Sijtsma, K., & Molenaar, I. W. (2002). *Introduction to non-parametric item response theory*. Thousand Oaks, CA: Sage.

Stattin, H., & Kerr, M. (2002). Adolescents' values matter. In J.-E. Nurmi (Ed.), *Navigating through adolescence: European perspectives* (pp. 21–58). New York: Routledge Farmer.

Tobler, N. S. (2000). Lessons learned. *The Journal of Primary Prevention*, *20*(4), 261–274.

Tobler, N. S., & Stratton, H. H. (1997). Effectiveness of school-based drug prevention programs: A meta-analysis of the research. *The Journal of Primary Prevention*, *18*(1), 71–128.

van Schuur, W. (2003). Mokken scale analysis: Between the Guttman scale and parametric item response theory. *Political Analysis*, *11*, 139–163.

Weichold, K., Giannotta, F., Silbereisen, R. K., Ciairano, S., & Wenzel, V. (2006). Cross-cultural evaluation of a life skills program to combat adolescent substance misuse. *SUCHT, German Journal of Addiction Research and Practice, 52*(4), 268–278.

White, H. R., Bates, M. E., & Labouvie, E. (1998). Adult outcomes of adolescent drug-use: A comparison of process-oriented and incremental analyses. In R. Jessor (Ed.), *New perspectives on adolescent risk behavior* (pp. 150–181). New York: Cambridge University Press.